

Orthogonal Polynomials and the Associated Jacobi Operator

Christian Berg, University of Copenhagen, Denmark

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Abstract

The talk is based on joint work with Ryszard Szwarc, Poland, see [1],[2].

We consider the Jacobi operator $(T, D(T))$ associated with an indeterminate Hamburger moment problem, i.e., the operator in ℓ^2 defined as the closure of the Jacobi matrix acting on the subspace of complex sequences with only finitely many non-zero terms. It is well-known that it is symmetric with deficiency indices $(1, 1)$. For a complex number z let $\mathbf{p}_z, \mathbf{q}_z$ denote the square summable sequences $(p_n(z))$ and $(q_n(z))$ corresponding to the orthonormal polynomials p_n and polynomials q_n of the second kind. We determine whether linear combinations of $\mathbf{p}_u, \mathbf{p}_v, \mathbf{q}_u, \mathbf{q}_v$ for $u, v \in \mathbb{C}$ belong to $D(T)$ or to the domain of the self-adjoint extensions of T in ℓ^2 . The results depend on the four Nevanlinna functions of two variables associated with the moment problem.

References

- [1] C. Berg and R. Szwarc, Indeterminate Jacobi operators, J. Operator Theory 93:1 (2025), 101–123. ArXiv:2301.00586.
- [2] C. Berg and R. Szwarc, Indeterminate Jacobi operators II, Submitted, ArXiv:2511.12684.